

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-108121

(43)Date of publication of application : 24.04.1998

(51)Int.Cl.

H04N 5/91

H04N 1/387

H04N 5/765

H04N 5/781

(21)Application number : 08-253343 (71)Applicant : NIKON CORP

(22)Date of filing : 25.09.1996 (72)Inventor : JIYUEN MASAHIRO

(54) ELECTRONIC CAMERA

(57)Abstract:

PROBLEM TO BE SOLVED: To provide the electronic camera that records a still image with high image quality while conducting recording processing of a still image and an animation image in common with respect to the electronic camera that records both the animation image and the still image.

SOLUTION: This camera is provided with an image pickup means 1 that picks up an object image and converts it into image information a pixel density conversion means 2 that converts pixel density of the image information converted by the image pickup means 1 into picture element density in matching with a scanning form of a display screen an animation image recording means 3 that receives sequentially the image information whose pixel density is converted by the pixel density conversion means 2 and records the received information as a series of animation images to a recording medium R and a still image recording means 4 that receives the image information converted by the image pickup means 1 and records the information as a still image in the recording medium R.

CLAIMS

[Claim(s)]

[Claim 1]An electronic camera comprising:

An imaging means which picturizes an object image and is changed into picture information.

A picture element density converting means which changes picture information changed by said imaging means into picture element density which suited a scan type of a display screen.

A recording animation means to incorporate picture information from which picture

element density was changed by said picture element density converting means one by one and to record on a recording medium as a series of video.

A still picture recording device which incorporates picture information changed by said imaging means and is recorded on a recording medium as a still picture.

[Claim 2] An electronic camera wherein said imaging means has more pixel numbers than a pixel number specified to said scan type in the electronic camera according to claim 1 and said picture element density converting means reduces picture information changed by said imaging means to picture element density which suited said scan type.

[Claim 3] In the electronic camera according to claim 1 or 2 if "recording instruction of a still picture" is given from the outside during recording periods of said recording animation means An electronic camera providing a buffer means which stores temporarily picture information from said imaging means synchronizing with the recording instruction and said still picture recording device's waiting for the completion of record of said recording animation means and recording picture information memorized by said buffer means on said recording medium.

[Claim 4] An electronic camera wherein said recording animation means and said still picture recording device share a coding conversion part which gives high efficiency coding in the field or a frame to incorporated picture information in an electronic camera given in any 1 paragraph of claim 1 thru/or claim 3.

[Claim 5] An electronic camera comprising:

An imaging means which picturizes an object image and is changed into picture information.

An image compression means which carries out graphical data compression of the picture information picturized by said imaging means.

A recording animation means to incorporate picture information in which graphical data compression was carried out by said image compression means one by one and to record on a recording medium as video.

A still picture recording device which incorporates picture information in which graphical data compression was carried out by said image compression means and is recorded on a recording medium as a still picture A compressibility change means which raises a compression ratio of said image compression means when recording said recording animation means and lowers a compression ratio of said image compression means when recording said still picture recording device.

[Claim 6] In the electronic camera according to claim 5 if "recording instruction of a still picture" is given from the outside during recording periods of said recording animation means Provide a buffer means which stores temporarily picture information from said imaging means synchronizing with the recording instruction and said image compression means An electronic camera characterized by what graphical data compression of the picture information which waited for the completion of record of said recording animation means and was memorized by said buffer means is carried out and said still picture recording device incorporates

"picture information of said buffer means" by which graphical data compression was carried out in said image compression means and is recorded on a recording medium as a still picture.

[Claim 7] An electronic camera given in any 1 paragraph of claim 1 thru/or claim 6 characterized by comprising the following.

A recording switch which receives recording instruction from the outside.

A change over switch which distributes recording instruction received by said recording switch to said recording animation means and said still picture recording device according to mode change directions from the outside.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the electronic camera which records both video and a still picture.

[0002]

[Description of the Prior Art] Recently photoelectric conversion of the object image is carried out it changes into the picture information of video and the electronic camera which performs graphical data compressions such as high efficiency coding to the picture information and is recorded on a recording medium is developed. As this kind of a typical electronic camera the video camera of DV method (digital video) is known.

[0003] In the video camera of this DV method the recording mode of a still picture can be provided it can combine with the audio signal over for several seconds and the still picture for one frame can be recorded.

[0004]

[Problem(s) to be Solved by the Invention] Thus in the conventional example the still picture equivalent to one frame of video was recorded as a snapshot.

[0005] Usually the picture information recorded as a still picture is printed on a paper medium using a video printer etc. in many cases. Therefore marked high definition is required compared with the video which moves every moment and is displayed on a screen. However in the conventional example the still picture was recorded by the image quality for one frame of video (for example removing a retrace line period in the NTSC system of YC component about 480 vertical definition about 500 horizontal resolution).

[0006] So it aims at providing the electronic camera which can record a still picture on high definition attaining sharing with the recording processing of a still picture and the recording processing of video in an invention given in claims 1 and 2.

[0007] In the invention according to claim 3 it combines with the purpose of claim 1 and aims at providing the electronic camera which can picture a still picture

optionally during record of video. In the invention according to claim 4 it combines with the purpose of claim 1 and aims at providing the electronic camera which raised further sharing with the recording processing of a still picture and the recording processing of video.

[0008] It aims at providing the electronic camera which can record a still picture on high definition attaining sharing with the recording processing of a still picture and the recording processing of video in the invention according to claim 5. In the invention according to claim 6 it combines with the purpose of claim 5 and aims at providing the electronic camera which can picturize a still picture optionally during record of video.

[0009] In the invention according to claim 7 it combines with the purpose of claim 1 and aims at providing the electronic camera which can improve operativity about the record change of a still picture and video.

[0010]

[Means for Solving the Problem] Drawing 1 is a principle block diagram corresponding to an invention given in claims 1 and 2.

[0011] written this invention is characterized by it having been alike and comprising the following at claim 1.

The imaging means 1 which picturizes an object image and is changed into picture information.

The picture element density converting means 2 which changes picture information changed by the imaging means 1 into picture element density which suited a scan type of a display screen.

A recording animation means 3 to incorporate picture information from which picture element density was changed by the picture element density converting means 2 one by one and to record on the recording medium R as a series of video.

The still picture recording device 4 which incorporates picture information changed by the imaging means 1 and is recorded on the recording medium R as a still picture.

[0012] The invention according to claim 2 has a pixel number with more imaging means 1 than a pixel number specified to a scan type in the electronic camera according to claim 1 and the picture element density converting means 2 reduces picture information changed by the imaging means 1 to picture element density which suited a scan type. Drawing 2 is a principle block diagram corresponding to the invention according to claim 3.

[0013] In the electronic camera according to claim 1 or 2 the invention according to claim 3 If recording instruction of a still picture is given from the outside during recording periods of the recording animation means 3 Picture information which the buffer means 5 which stores temporarily picture information from the imaging means 1 synchronizing with the recording instruction was provided and the still picture recording device 4 waited for the completion of record of the recording animation means 3 and was memorized by the buffer means 5 is recorded on the recording medium R.

[0014]Drawing 3 is a principle block diagram corresponding to the invention according to claim 4. In an electronic camera of a statementthe invention according to claim 4 in any 1 paragraph of claim 1 thru/or claim 3 the recording animation means 3 and the still picture recording device 4The coding conversion part 6 which gives high efficiency coding in the field or a frame is shared to incorporated picture information.

[0015]Drawing 4 is a principle block diagram corresponding to the invention according to claim 5. written this invention is characterized by it having been alike and comprising the following at claim 5.

The imaging means 1 which picturizes an object image and is changed into picture information.

The image compression means 7 which carries out graphical data compression of the picture information picturized by the imaging means 1.

A recording animation means 3 to incorporate picture information in which graphical data compression was carried out by the image compression means 7 one by oneand to record on the recording medium R as video.

The compressibility change means 8 which incorporates picture information in which graphical data compression was carried out by the image compression means 7raises a compression ratio of the image compression means 7 when recording the still picture recording device 4 recorded on the recording medium R as a still pictureand the recording animation means 3and lowers a compression ratio of the image compression means 7 when recording the still picture recording device 4.

A compression ratio here is equivalent to a ratio of "a decrement of the amount of information after compression" to "the amount of information before compression."

[0016]Drawing 5 is a principle block diagram corresponding to the invention according to claim 6. In the electronic camera according to claim 5if recording instruction of a still picture is given from the outside during recording periods of the recording animation means 3the invention according to claim 6Provide the buffer means 5 which stores temporarily picture information from the imaging means 1 synchronizing with the recording instructionand the image compression means 7Graphical data compression of the picture information which waited for the completion of record of the recording animation means 3and was memorized by the buffer means 5 is carried outand the still picture recording device 4 incorporates "picture information of the buffer means 5" by which graphical data compression was carried out in the image compression means 7and records it on the recording medium R as a still picture.

[0017]Drawing 6 is a principle block diagram corresponding to the invention according to claim 7. The invention according to claim 7 has [this invention] an electronic camera of a statement characterized by that any 1 paragraph of claim 1 thru/or claim 6 comprises the following.

The recording switch 10a which receives recording instruction from the outside.
The change over switch 10b which distributes recording instruction received by

the recording switch 10a to the recording animation means 3 and the still picture recording device 4 according to mode change directions from the outside.

[0018](OPERATION) In an electronic camera of claim 1 when recording videopicture information from the imaging means 1 is first changed into picture element density which suited a scan type of a display screen via the picture element density converting means 2. Monitor display attached to a case of an electronic camera or not only an electronic finder but a display of a picture connected to a generating picture terminal of an electronic camera for example and a device which reproduces and displays picture information from the recording medium R are contained in a display screen here.

[0019] The recording animation means 3 incorporates and carries out the video of the picture information after picture element density conversion and records it on the recording medium R. On the other hand when recording a still picture picture information is incorporated into the still picture recording device 4 without passing the picture element density converting means 2. The still picture recording device 4 records this picture information on the recording medium R.

[0020] In an electronic camera of claim 2 it has a pixel number with more imaging means 1 than a pixel number specified to a scan type of a display screen. Therefore picture information is generated by picture element density higher than regulation of a scan type in the imaging means 1. Here when recording video the picture element density converting means 2 is reduced to picture element density which doubled picture information with this high picture element density with a scan type. The recording animation means 3 records picture information after this conversion on the recording medium R.

[0021] On the other hand when recording a still picture the still picture recording device 4 is recorded on the recording medium R by using as a still picture picture information of a state where this picture element density is high. In an electronic camera of claim 3 if recording instruction of a still picture is given from the outside during recording periods of video as for the buffer means 5 picture information from the imaging means 1 will be memorized temporarily.

[0022] The still picture recording device 4 waits for the completion of record of the recording animation means 3 and records picture information memorized by the buffer means 5 on the recording medium R. Thus a snapshot can be certainly picturized during record of video. In an electronic camera of claim 4 the coding conversion part 6 for carrying out high efficiency coding of the picture information is shared in the recording animation means 3 and the still picture recording device 4.

[0023] For example in a coding conversion part of video processing of DCT operation inter frame prediction variable length coding etc. is performed. On the other hand as a coding conversion part of a still picture a DCT operation part and processing of variable length coding etc. are performed. Therefore if it restricts to processing in a frame in a coding conversion part of video or the field it becomes the processing which was common in a coding conversion part of a still picture.

[0024]By making the coding conversion part 6 of a portion which is common in this way serve a double purposecircuitrya data-processing algorithmetc. of an electronic camera can be simplified. In an electronic camera of claim 5a compression ratio of the image compression means 7 is raised at the time of record of videoand a compression ratio is lowered with it at the time of record of a still picture. In an electronic camera of claim 6if recording instruction of a still picture is given from the outside during recording periods of videosynchronizing with the recording instructionsas for the buffer means 5picture information from the imaging means 1 will be memorized temporarily.

[0025]In this statethe image compression means 7 waits for the completion of record of the recording animation means 3and compresses picture information memorized by the buffer means 5. The still picture recording device 4 records picture information compressed in this way on the recording medium R. Thereforea snapshot can be certainly picturized during record of video.

[0026]In an electronic camera of claim 7the recording switch 10a is made to serve a double purpose by switching with the change over switch 10b as a switch which operates the still picture recording device 4 and the recording animation means 3.

[0027]

[Embodiment of the Invention]Hereafterthe embodiment in this invention is described based on a drawing.

[0028](A 1st embodiment) Drawing 7 is a functional block diagram of a 1st embodiment (it corresponds to claims 1-4and 7). Drawing 8 is a figure showing the appearance of a 1st embodiment. In drawing 7 and drawing 8the camera part 11a is attached to the side of the main part 11 of an electronic cameraenabling free rotationand the camera part 11a is equipped with the taking lens 12 which carries out image formation of the object image.

[0029]The optic axis of the taking lens 12 is crooked in the camera part 11aand the acceptance surface of the image sensor 13 which consists of CCD series etc. on extension of the optic axis is arranged. For examplethe pixel number of this image sensor 13 is about 1280 vertical 960x widthand is about 2-time every direction of the effective resolution of NTSC system. The photoelectrical output of the image sensor 13 is connected to the video signal processing section 15 which performs white balance adjustmenta gamma correctionetc. via the A/D conversion part 14.

[0030]The picture information output of the video signal processing section 15 is inputted into the picture element density converter 16 and the memory I/O part 17. The picture element density converter 16 changes picture element density by giving interpolationblock equalizationinfanticideetc. to the pixel value of picture information. The memory I/O part 17 controls input and output of picture information to the system bath 19 of the microprocessor 18.

[0031]The output of the picture element density converter 16 and the memory I/O part 17 is inputted into the coding conversion part 21 via the interface part 20. The interface part 20 is controlled by the microprocessor 18 via the system bath 19. The coding conversion part 21 gives high efficiency coding to picture

information and outputs picture information to the system bath 19.

[0032] The memory 22, the disk drive part 23, the liquid crystal display section 25 and the touch panel 25a are connected to the system bath 19 respectively. It is used for information processing of the microprocessor 18 and the memory 22 is used also as a buffer which stores picture information temporarily. The disk drive part 23 is equipped with the optical magnetic recording medium 24 from the outside.

[0033] The liquid crystal display section 25 is arranged at the rear-face side of the main part 11 and the touch panel 25a is stuck on the surface of the liquid crystal display section 25. The record button 26, mode ** 27 etc. which have been arranged at the main part 11 are connected to the microprocessor 18.

[0034] Drawing 9 is a schematic diagram explaining the composition of the coding conversion part 21. In drawing 9 the picture information incorporated via the interface part 20 (drawing 7) is inputted into the pixel placement part 31 and the motion vector primary detecting element 33. The output of the pixel placement part 31 is connected to the 1st input of the subtractor 32 and the 1st input of the switch 34 respectively.

[0035] The output of the subtractor 32 is connected to the 2nd input of the switch 34 and the output of the switch 34 is connected to the quantizing part 36 via the DCT operation part 35. The output of the quantizing part 36 is connected to the inverse quantization part 37 and the variable length coding section 38 and the output of the variable length coding section 38 is connected to the 1st input of the data multiplex section 39. On the other hand the output of the inverse quantization part 37 is connected to the 1st input of the adding machine 41 via the reverse DCT operation part 40. The picture information which the output of the adding machine 41 was connected to the image memory 42 with the storage capacity for several frames and was accumulated in the image memory 42 is inputted into the 2nd input of the motion vector primary detecting element 33 and the 1st input of the motion compensation section 43.

[0036] It is connected to the 2nd input of the motion compensation section 43 and the output of the motion vector primary detecting element 33 is connected to the 2nd input of the data multiplex section 39 via the switch 45. The inter-frame prediction result outputted from the motion compensation section 43 is inputted into the 2nd input of the subtractor 32 and it is inputted into the 2nd input of the adding machine 41 via the switch 44. On the other hand the control output of the compressed mode control section 46 connected to the system bath 19 is connected to the pixel placement part 31, the switch 34, the switch 44, the switch 45, the control header generating part 47 etc.

[0037] Input and output of the control header generating part 47 are individually connected to the 3rd input of the quantizing part 36, the variable length coding section 38 and the data multiplex section 39. The output of the data multiplex section 39 is connected to the system bath 19.

[0038] About the correspondence relation of an invention and a 1st embodiment given in claims 1 and 2. The imaging means 1 corresponds to the taking lens 12, the image sensor 13, the A/D conversion part 14 and the video signal processing

section 15The picture element density converting means 2 corresponds to the picture element density converter 16and the recording animation means 3 corresponds to "the function which controls the recording operation of video" of the coding conversion part 21the disk drive part 23and the microprocessor 18The still picture recording device 4 corresponds to "the function which controls the recording operation of a still picture" of the coding conversion part 21the disk drive part 23and the microprocessor 18.

[0039]About the correspondence relation of an invention according to claim 3 and a 1st embodimentthe buffer means 5 corresponds to the memory I/O part 17 and the memory 22. About the correspondence relation of an invention according to claim 4 and a 1st embodimentthe coding conversion part 6 corresponds to the pixel placement part 31the DCT operation part 35the quantizing part 36the variable length coding section 38and the data multiplex section 39.

[0040]About the correspondence relation of an invention according to claim 7 and a 1st embodimentthe recording switch 10a corresponds to the record button 26and the change over switch 10b corresponds to mode ** 27. Drawing 10 and drawing 11 are the flow charts explaining operation of a 1st embodiment. Hereafteroperation of a 1st embodiment is explained using these figures.

[0041]Firstafter judging it as the still mode in which the microprocessor 18 performs static image photographing as mode ** 27 is pushed and changing the liquid crystal display section 25 into the display for still modesit shifts to Step S20 mentioned later (drawing 10 S1). On the other handin the state where mode ** 27 is not pushed(drawing 10 S1) and the microprocessor 18 judge it as the movie mode in which animation photography is performed.

[0042](Recording operation of video) If the record button 26 is pushed in the state of this movie mode (drawing 10 S2)the microprocessor 18 will set up the coding conversion part 21 according to movie mode (drawing 10 S3).

[0043]That isvia the compressed mode control section 46the microprocessor 18 sets the output selection of the switch 34 as the 1st input sideand makes the switch 44 and the switch 45 an ON state fundamentally. Herethe picture element density converter 16 incorporates the picture information digitized from the camera part 11a one by one (drawing 10 S4).

[0044]The picture element density converter 16 equalizes picture information every picture element block of 2x2and reduces it to 480x640-pixel-long picture element density (drawing 10 S5). Herethe picture element density of a lengthwise direction becomes equal to 480 except the 525 number of scanning lines of the lengthwise direction of NTSC system to a retrace line period. The microprocessor 18 switches the output selection of the interface part 20and transmits the output of the picture element density converter 16 to the coding conversion part 21.

[0045]In coding conversion part 21 insidehigh efficiency coding according to video is performed as follows. Firstin the pixel placement part 31picture information is divided and outputted every picture element block of 8x8. The subtractor 32 incorporates these picture element blocksand computes difference (prediction error) with the picture element block by which inter frame prediction was carried

out in the motion compensation section 43 (drawing 10 S6).

[0046]The DCT operation part 35 changes the pixel value of 8x8 into the DCT coefficient of 64 pieces by giving a discrete cosine transform to this prediction error. The quantizing part 36 quantizes these DCT coefficients according to a predetermined quantization table. The variable length coding section 38 changes a quantization DCT coefficient into variable length codes such as Huffman coding and outputs it to the data multiplex section 39 (drawing 10 S7).

[0047]On the other hand in the inverse quantization part 37 the reverse DCT operation part 40 and the adding machine 41 it carries out based on a quantization DCT coefficient and decryption of picture information is performed. The decrypted picture information is stored in the image memory 42 one by one. The motion vector primary detecting element 33 compares with the present picture information the decryption picture information of the past stored in the image memory 42 and detects the motion vector based on rigid body assumption of a photographic subject.

[0048]The motion vector detected in this way is transmitted to the data multiplex section 39 and it is used for the inter frame prediction in the motion compensation section 43. On the other hand in the control header generating part 47 header information having included a quantization table a Huffman encoding table etc. is generated and it is transmitted to the data multiplex section 39.

[0049]In the data multiplex section 39 multiplex [of the data transmitted from the variable length coding section 38 the motion vector primary detecting element 33 and the control header generating part 47] is carried out and it outputs to the system bath 19. In general MPEG compression the data of intra-frame one the B frame etc. is also generated one by one and is outputted to the system bath 19.

[0050]The disk drive part 23 incorporates these data one by one and records it on the optical magnetic recording medium 24 (drawing 10 S8). The graphics file of (drawing 10 S9) and video is generated on the optical magnetic recording medium 24 by repeating the above-mentioned recording operation until the record button 26 is pushed again. On the other hand during the recording periods of video if mode ** 27 and the record button 26 are simultaneous or are pushed in order (drawing 10 S10 S11) the microprocessor 18 will judge that still photographing was directed from the outside and will evacuate the picture information for one frame as follows.

[0051](Saving operation of a still picture) It is judged whether the picture information for one frame is storable in the memory 22 which is an evacuation place first (drawing 10 S12). Here when an availability is insufficient a warning message is displayed on the liquid crystal display section 25 (drawing 10 S13) still mode is canceled (drawing 10 S15) and the recording operation of video is continued as it is.

[0052]On the other hand when fully sufficient for an availability the memory I/O part 17 incorporates the picture information from the camera part 11a by one frame and makes this still picture store temporarily in the memory 22 via the system bath 19 (drawing 10 S14). The recording operation of video is continued as it is between this saving operation. Evacuation of a still picture is performed by a

multiple frames as long as the capacity of the memory 22 allows.

[0053](Completion processing of the recording operation of video) If the record button 26 is again pushed during the recording operation of such video at the time of step S9 the recording operation of video will be completed. At this time the microprocessor 18 judges whether saving operation of the still picture above-mentioned during the recording operation of video was performed (drawing 10 S16).

[0054] Here when saving operation of the still picture is not performed the microprocessor 18 repeats the operation returned and mentioned above to Step S1. On the other hand when saving operation of the still picture is performed the microprocessor 18 reads a still picture from the memory 22 (drawing 11 S17) moves operation to Step S22 mentioned later and performs record of a still picture.

[0055] If mode ** 27 is pushed in Step S1 in (the recording operation of a still picture) and time the microprocessor 18 shifts to Step S20 and it will stand by until the record button 26 is pushed.

[0056] In this state if the record button 26 is pushed (drawing 11 S20) the microprocessor 18 will incorporate the still picture for one frame from the camera part 11a via the memory I/O part 17. This still picture is once memorized by the memory 22 etc. Next the microprocessor 18 sets the coding conversion part 21 as the still mode for still picture compression (drawing 11 S22).

[0057] That is the microprocessor 18 sets the output selection of the switch 34 as the 2nd input side via the compressed mode control section 46 and makes the switch 44 and the switch 45 an OFF state. The pixel placement part 31 stores all still pictures with high picture element density by reusing the image memory 42 for inter frame prediction (drawing 11 S23).

[0058] Next in the pixel placement part 31 the picture information of a still picture is divided into the picture element block of 8x8 and is outputted. The DCT operation part 35 changes the pixel value of 8x8 into the DCT coefficient of 64 pieces by giving a discrete cosine transform to this picture element block. The quantizing part 36 quantizes these DCT coefficients according to a predetermined quantization table.

[0059] The variable length coding section 38 changes a quantization DCT coefficient into variable length code such as Huffman coding and outputs it to the data multiplex section 39 (drawing 11 S24). On the other hand in the control header generating part 47 header information having included a quantization table a Huffman encoding table etc. is generated and it is transmitted to the data multiplex section 39.

[0060] In the data multiplex section 39 multiplex [of the data transmitted from the variable length coding section 38 and the control header generating part 47] is carried out and it outputs to the system bus 19. The disk drive part 23 incorporates these data one by one and records it on the optical magnetic recording medium 24 as a graphics file of a still picture (drawing 11 S25).

[0061] Here the microprocessor 18 investigates whether the still picture evacuated on the memory 22 remains (drawing 11 S26) when remaining returns to Step S17

and incorporates picture information. On the other hand when not remaining it returns to Step S1. As explained above in a 1st embodiment the image sensor 13 the A/D conversion part 14 and the video signal processing section 15 can be shared to the recording processing of a still picture and video.

[0062] A still picture is recordable by high definition rather than video recording video with the picture element density which suited the scan type by switching picture element density by the picture element density converter 16. Since a still picture is evacuated to the memory 22 temporarily a still picture can be certainly photoed during the recording periods of video.

[0063] Since the intersection of the coding conversion part 21 is made to serve a double purpose by coding processing of a still picture/video composition a data-processing algorithm etc. of an electronic camera can be simplified. The record button 26 can be used together as a picture recording switch of a still picture/video by pushing mode ** 27.

[0064] Next another embodiment is described.

(A 2nd embodiment) Drawing 12 is a functional block diagram of a 2nd embodiment (it corresponds to claims 5 and 6). It is the point that the picture element density converter 16 (drawing 7) is excluded about the constitutional feature in a 2nd embodiment.

[0065] About the same constituent features as the constituent features shown in drawing 7 – 9 the same reference number is given and shown and duplication explanation here is omitted. Here about the correspondence relation of an invention according to claim 5 and a 2nd embodiment. The imaging means 1 corresponds to the taking lens 12 the image sensor 13 the A/D conversion part 14 and the video signal processing section 15 The recording animation means 3 corresponds to “the function which controls record of video” of the disk drive part 23 and the microprocessor 18 The still picture recording device 4 corresponds to “the function which controls record of a still picture” of the disk drive part 23 and the microprocessor 18 The image compression means 7 corresponds to the coding conversion part 21 and the compressibility change means 8 corresponds to “the function to change a quantization table” of the compressed mode control section 46 the control header generating part 47 and the microprocessor 18.

[0066] About the correspondence relation of an invention according to claim 6 and a 2nd embodiment the buffer means 5 corresponds to the memory I/O part 17 and the memory 22. Drawing 13 and drawing 14 are the flow charts explaining operation of a 2nd embodiment. The main features on the operation in a 2nd embodiment are the following two points.

1) The control header generating part 47 changes each value of a quantization table greatly generally when recording video (drawing 13 S5).

[0067] 2) The control header generating part 47 changes each value of a quantization table small generally when recording a still picture (drawing 14 S22a). By such operation by a 2nd embodiment the rate of graphical data compression of a still picture is stopped low and degradation at the time of reproduction of a still picture is reduced. About video the rate of graphical data compression becomes

high and the file capacity of video can be stopped small.

[0068] Since the memory 22 evacuates a still picture temporarily a still picture is certainly recordable during the recording periods of video. Although the manual operation of recording is received in the embodiment mentioned above by the record button 26 and mode ** 27 with which the main part 11 was equipped this invention is not limited to this composition. For example an operation screen as shown in drawing 15 - 17 may be displayed on the liquid crystal display section 25 and manual operation may be received via the touch panel 25a. In such a case whenever mode ** 62 and 72 shown in drawing 16 and drawing 17 is pushed respectively it is preferred to switch these screens by turns and to display them.

[0069] In the embodiment mentioned above although the optical magnetic recording medium 24 is adopted as a recording medium this invention should just be a recording medium which is not limited to the construction material or shape structure of a recording medium and can record picture information. For example an optical recording medium a magnetic recording medium a memory card etc. may be sufficient. What is necessary is just to reproduce a still picture with high picture element density as it is at the embodiment mentioned above for example when printing to a paper medium with a video printer etc. although the reproduction motion of the still picture is not described. When picture element density is specified by the video printer side a means to change a still picture into the picture element density may be formed.

[0070] On the other hand when displaying a still picture on a display screen the still picture of high picture element density may be changed into "the picture element density which suited the scan type of the display screen" by diverting the picture element density converting means 2 at the time of record to some other purpose at the time of reproduction. by such composition it becomes unnecessary to establish separately the picture element density converting means only for reproduction and the repeat display circuit and regeneration algorithm of an electronic camera can be boiled markedly and it can simplify.

[0071]

[Effect of the Invention] As explained above in the invention according to claim 1 the image quality of a still picture and the image quality of video can be suitably switched by a picture element density converting means sharing an imaging means to the recording processing of a still picture and video. Video is suitably recorded by work of a picture element density converting means according to the scan type of a display screen. Therefore no picture element density (picture element density of a still picture) of an imaging means is restrained by the scan type of a display screen but can be designed flexibly and suitably.

[0072] In the invention according to claim 2 a still picture is recordable by high definition rather than video sharing an imaging means to the recording processing of a still picture and video. In the invention according to claim 3 when a buffer means stores a still picture temporarily during record of video a still picture can be picturized certainly. therefore an operator -- under record of video ***** --

irrespective of -- it becomes possible to record a pleasing snapshot as a high-definition still picture.

[0073]In the invention according to claim 4since the intersection in connection with the processing in the field of a coding conversion part or the processing in a frame is made to serve a double purpose by processing of a still

picture/videocompositiona data-processing algorithmetc. of an electronic camera can be simplified efficiently. In the invention according to claim 5a still picture is recordable by high definition rather than videosharing an imaging means and an image compression means to the recording processing of a still picture and video.

[0074]In the invention according to claim 6when a buffer means stores a still picture temporarilyduring record of videoa still picture can be picturized certainly. thereforean operator -- under record of video ***** -- irrespective of -- it becomes possible to record a pleasing snapshot as a high-definition still picture. In the invention according to claim 7a recording switch is used together by switching with a change over switch as a switch which starts a still picture recording device and a recording animation means. Thereforethe operativity of recording operation becomes high.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a principle block diagram corresponding to an invention given in claims 1 and 2.

[Drawing 2]It is a principle block diagram corresponding to the invention according to claim 3.

[Drawing 3]It is a principle block diagram corresponding to the invention according to claim 4.

[Drawing 4]It is a principle block diagram corresponding to the invention according to claim 5.

[Drawing 5]It is a principle block diagram corresponding to the invention according to claim 6.

[Drawing 6]It is a principle block diagram corresponding to the invention according to claim 7.

[Drawing 7]It is a functional block diagram of a 1st embodiment (it corresponds to claims 1-4and 7).

[Drawing 8]It is a figure showing the appearance of a 1st embodiment.

[Drawing 9]It is a schematic diagram explaining the composition of the coding conversion part 21.

[Drawing 10]It is a flow chart (1) explaining operation of a 1st embodiment.

[Drawing 11]It is a flow chart (2) explaining operation of a 1st embodiment.

[Drawing 12]It is a functional block diagram of a 2nd embodiment (it corresponds to claims 5 and 6).

[Drawing 13]It is a flow chart (1) explaining operation of a 2nd embodiment.

[Drawing 14]It is a flow chart (2) explaining operation of a 2nd embodiment.

[Drawing 15]It is a figure showing the operation instances on the screen in this embodiment.

[Drawing 16]It is a figure showing the operation instances on the screen in this embodiment.

[Drawing 17]It is a figure showing the operation instances on the screen in this embodiment.

[Description of Notations]

- 1 Imaging means
- 2 Picture element density converting means
- 3 Recording animation means
- 4 Still picture recording device
- 5 Buffer means
- 6 Coding conversion part
- 7 Image compression means
- 8 Compressibility change means
- 10a Recording switch
- 10b Change over switch
- 11 Main part
- 11a Camera part
- 12 Taking lens
- 13 Image sensor
- 14 A/D conversion part
- 15 Video signal processing section
- 16 Picture element density converter
- 17 Memory I/O part
- 18 Microprocessor
- 19 System bath
- 20 Interface part
- 21 Coding conversion part
- 22 Memory
- 23 Disk drive part
- 24 Optical magnetic recording medium
- 25 Liquid crystal display section
- 25a Touch panel
- 26 Record button
- 27 Mode **
- 31 Pixel placement part
- 32 Subtractor
- 33 Motion vector primary detecting element
- 34 Switch
- 35 DCT operation part
- 36 Quantizing part
- 37 Inverse quantization part

- 38 Variable length coding section
 - 39 Data multiplex section
 - 40 Reverse DCT operation part
 - 41 Adding machine
 - 42 Image memory
 - 43 Motion compensation section
 - 44 Switch
 - 45 Switch
 - 46 Compressed mode control section
 - 47 Control header generating part
-